Apprenticeship and Industry Training

Recreation Vehicle Service Technician Apprenticeship Course Outline

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Alberta

Apprenticeship and Industry Training

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Recreational Vehicle Service Technician
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Apprenticeship

Apprenticeship is post-secondary education with a difference. Apprenticeship begins with finding an employer. Employers hire apprentices, pay their wages and provide on-the-job training and work experience. Approximately 80 per cent of an apprentice's time is spent on the job under the supervision of a certified journeyperson or qualified tradesperson. The other 20 per cent involves technical training provided at, or through, a post-secondary institution – usually a college or technical institute.

To become certified journeypersons, apprentices must learn theory and skills, and they must pass examinations. Requirements for certification—including the content and delivery of technical training—are developed and updated by the Alberta Apprenticeship and Industry Training Board on the recommendation of the Recreational Vehicle Service Technician Provincial Apprenticeship Committee.

The graduate of the Recreational Vehicle Service Technician apprenticeship program is a certified journeyperson who will be able to:

- know the standards and regulations that relate to recreation vehicles
- install, repair and maintain LP gas distribution systems and appliances
- install, repair and maintain plumbing and electrical systems
- be proficient in the use and maintenance of shop tools, instruments and equipment
- install, repair & maintain exterior structural components, coverings and fixtures
- install, repair & maintain interior components and fixtures
- install, repair & maintain interior and exterior accessories
- understand workplace etiquette and productivity objectives
- know the OH&S and dangerous goods regulations as they relate to the RV Industry
- perform assigned tasks in accordance with quality and production standards required by industry

Apprenticeship and Industry Training System

Industry-Driven

Alberta's apprenticeship and industry training system is an industry-driven system that ensures a highly skilled, internationally competitive workforce in more than 50 designated trades and occupations. This workforce supports the economic progress of Alberta and its competitive role in the global market. Industry (employers and employees) establishes training and certification standards and provides direction to the system through an industry committee network and the Alberta Apprenticeship and Industry Training Board. The Alberta government provides the legislative framework and administrative support for the apprenticeship and industry training system.

Alberta Apprenticeship and Industry Training Board

The Alberta Apprenticeship and Industry Training Board provides a leadership role in developing Alberta's highly skilled and trained workforce. The board's primary responsibility is to establish the standards and requirements for training and certification in programs under the Apprenticeship and Industry Training Act. The board also provides advice to the Minister of Advanced Education and Technology on the needs of Alberta's labour market for skilled and trained workers, and the designation of trades and occupations.

The thirteen-member board consists of a chair, eight members representing trades and four members representing other industries. There are equal numbers of employer and employee representatives.

Industry Committee Network

Alberta's apprenticeship and industry training system relies on a network of industry committees, including local and provincial apprenticeship committees in the designated trades, and occupational committees in the designated occupations. The network also includes other committees such as provisional committees that are established before the designation of a new trade or occupation comes into effect. All trade committees are composed of equal numbers of employer and employee representatives. The industry committee network is the foundation of Alberta's apprenticeship and industry training system.

Local Apprenticeship Committees (LAC)

Wherever there is activity in a trade, the board can set up a local apprenticeship committee. The board appoints equal numbers of employee and employer representatives for terms of up to three years. The committee appoints a member as presiding officer. Local apprenticeship committees:

- monitor apprenticeship programs and the progress of apprentices in their trade, at the local level
- make recommendations to their trade's provincial apprenticeship committee (PAC) about apprenticeship and certification in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- make recommendations to the board about the appointment of members to their trade's PAC
- help settle certain kinds of disagreements between apprentices and their employers
- carry out functions assigned by their trade's PAC or the board

Provincial Apprenticeship Committees (PAC)

The board establishes a provincial apprenticeship committee for each trade. It appoints an equal number of employer and employee representatives, and, on the PAC's recommendation, a presiding officer - each for a maximum of two terms of up to three years. Most PACs have nine members but can have as many as twenty-one. Provincial apprenticeship committees:

- Make recommendations to the board about:
    - standards and requirements for training and certification in their trade
    - courses and examinations in their trade
    - apprenticeship and certification
    - designation of trades and occupations
    - regulations and orders under the Apprenticeship and Industry Training Act
- monitor the activities of local apprenticeship committees in their trade
- determine whether training of various kinds is equivalent to training provided in an apprenticeship program in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- consult with other committees under the Apprenticeship and Industry Training Act about apprenticeship programs, training and certification and facilitate cooperation between different trades and occupations
- consult with organizations, associations and people who have an interest in their trade and with employers and employees in their trade
- may participate in resolving certain disagreements between employers and employees
- carry out functions assigned by the board

Recreational Vehicle Service Technician PAC Members at the Time of Publication

Mr. W. Hammermeister	Edmonton	Presiding Officer
Mr. K. Hutton	Calgary	Employer
Mr. B. Roberts	Calgary	Employer
Mr. A. Caron	Edmonton	Employer
Mr. A. Dack	Edmonton	Employer
Mr. T. Burns	Red Deer	Employee
Mr. D. Malaniuk	Edmonton	Employee

Alberta Government

Alberta Advanced Education and Technology works with industry, employer and employee organizations and technical training providers to:

- facilitate industry's development and maintenance of training and certification standards
- provide registration and counselling services to apprentices and employers
- coordinate technical training in collaboration with training providers
- certify apprentices and others who meet industry standards

Technical Institutes and Colleges

The technical institutes and colleges are key participants in Alberta's apprenticeship and industry training system. They work with the board, industry committees and Alberta Advanced Education and Technology to enhance access and responsiveness to industry needs through the delivery of the technical training component of apprenticeship programs. They develop lesson plans from the course outlines established by industry and provide technical training to apprentices.

Apprenticeship Safety

Safe working procedures and conditions, incident/injury prevention, and the preservation of health are of primary importance in apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of government, employers, employees, apprentices and the public. Therefore, it is imperative that all parties are aware of circumstances that may lead to injury or harm.

Safe learning experiences and healthy environments can be created by controlling the variables and behaviours that may contribute to or cause an incident or injury. By practicing a safe and healthy attitude, everyone can enjoy the benefit of an incident and injury free environment.

Alberta Apprenticeship and Industry Training Board Safety Policy

The Alberta Apprenticeship and Industry Training Board fully supports safe learning and working environments and encourages the teaching of proper safety procedures both within trade specific training and in the workplace.

Trade specific safety training is an integral component of technical training, while ongoing or general non-trade specific safety training remains the responsibility of the employer and the employee as required under workplace health and safety legislation.

Workplace Responsibilities

The employer is responsible for:

- training employees and apprentices in the safe use and operation of equipment
- providing and maintaining safety equipment, protective devices and clothing
- enforcing safe working procedures
- providing safeguards for machinery, equipment and tools
- observing all accident prevention regulations

The employee and apprentice are responsible for:

- working in accordance with the safety regulations pertaining to the job environment
- working in such a way as not to endanger themselves, fellow employees or apprentices

Workplace Health and Safety

A tradesperson is often exposed to more hazards than any other person in the work force and therefore should be familiar with and apply the Occupational Health and Safety Act, Regulations and Code when dealing with personal safety and the special safety rules that apply to all daily tasks.

Workplace Health and Safety (Alberta Employment, Immigration and Industry) conducts periodic inspections of workplaces to ensure that safety regulations for industry are being observed.

Additional information is available at www.worksafely.org

Technical Training

Apprenticeship technical training is delivered by the technical institutes and many colleges in the public post-secondary system throughout Alberta. The colleges and institutes are committed to delivering the technical training component of Alberta apprenticeship programs in a safe, efficient and effective manner. All training providers place great emphasis on safe technical practices that complement safe workplace practices and help to develop a skilled, safe workforce.

The following institutions deliver Recreational Vehicle Service Technician apprenticeship technical training:

Southern Alberta Institute of Technology (Mayland Heights Campus)

Procedures for Recommending Revisions to the Course Outline

Advanced Education and Technology has prepared this course outline in partnership with the Recreational Vehicle Service Technician Provincial Apprenticeship Committee.

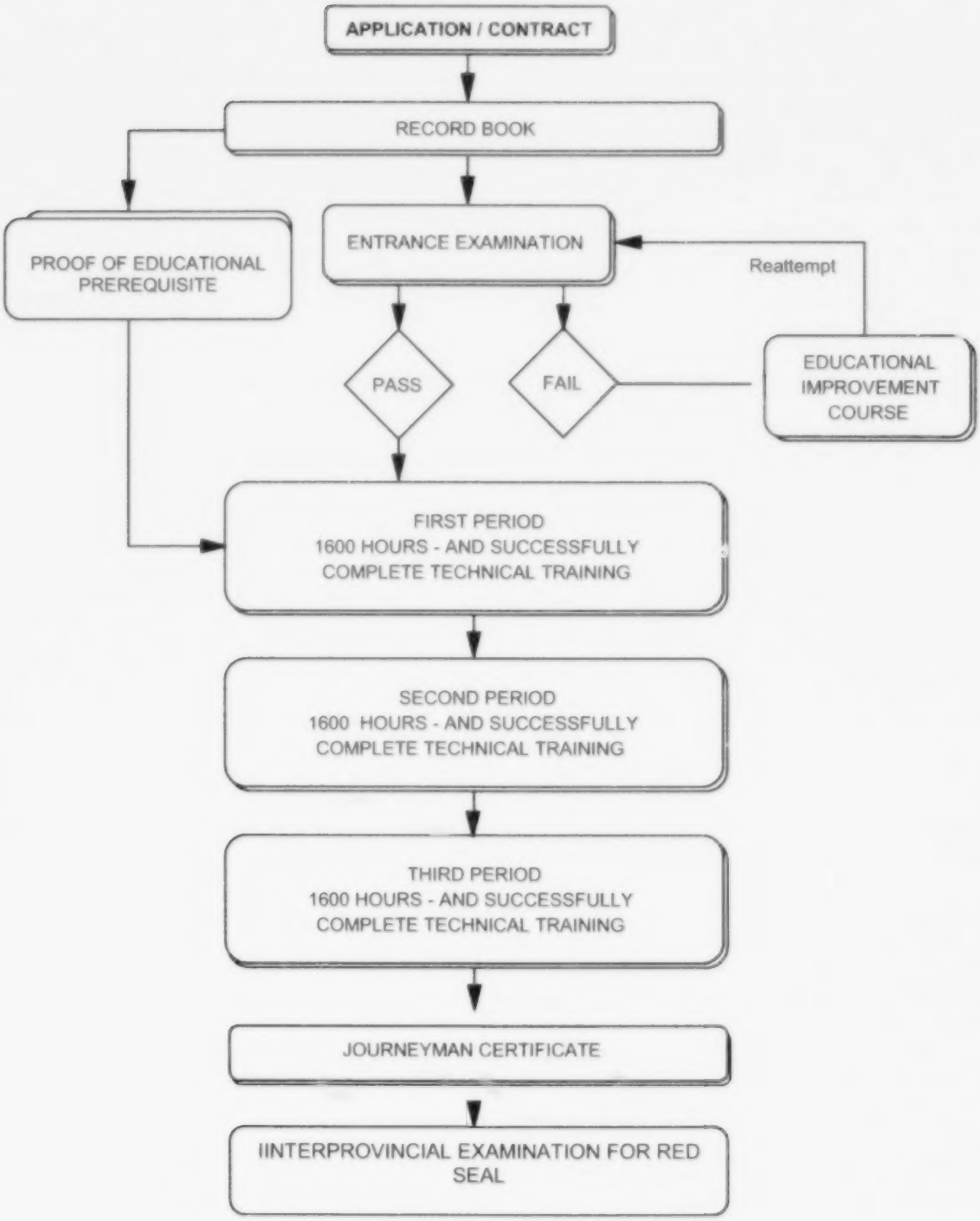
This course outline was approved on June 22, 2007 by the Alberta Apprenticeship and Industry Training Board on a recommendation from the Provincial Apprenticeship Committee. The valuable input provided by representatives of industry and the institutions that provide the technical training is acknowledged.

Any concerned individual or group in the province of Alberta may make recommendations for change by writing to:

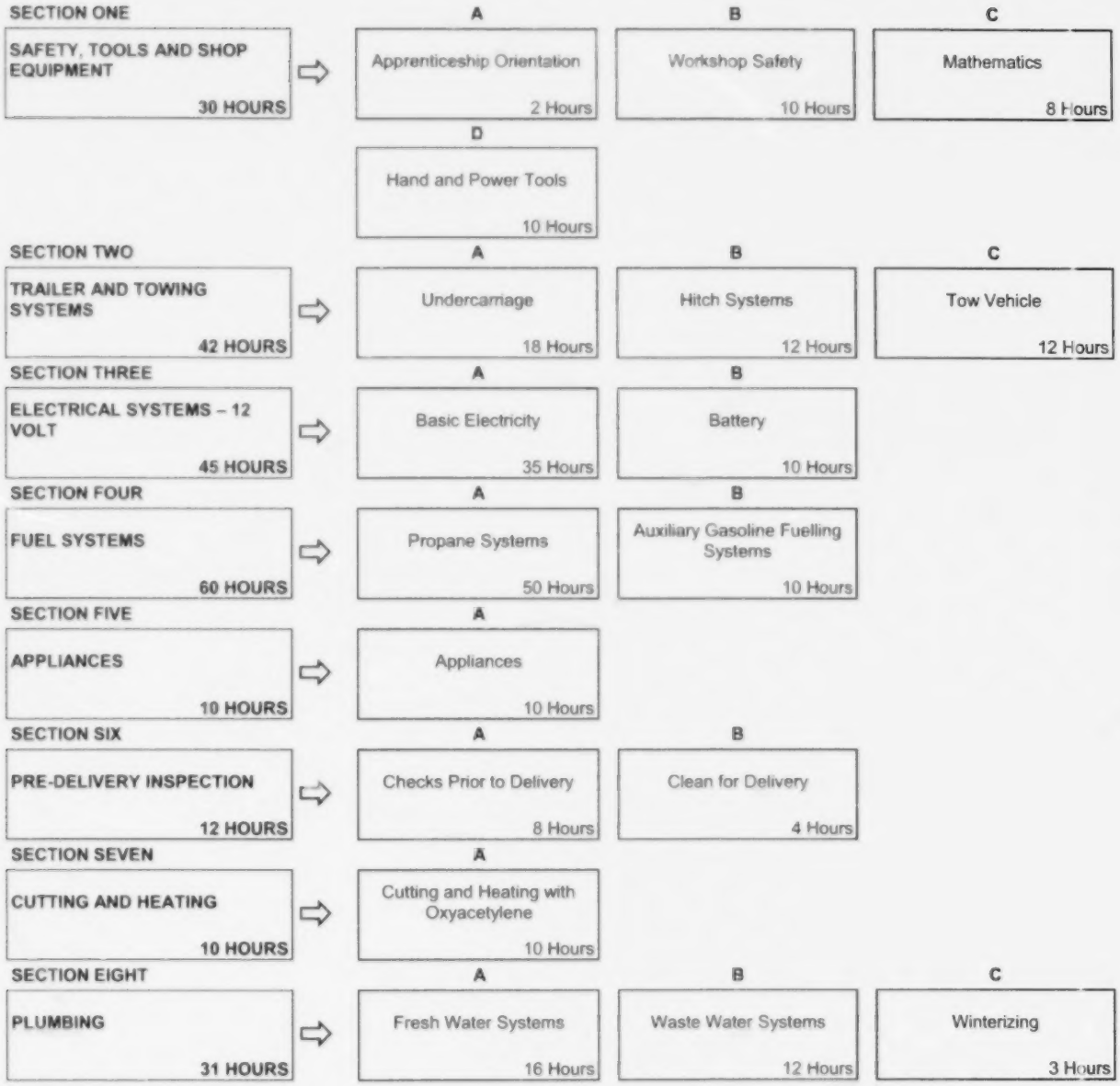
Recreational Vehicle Service Technician Provincial Apprenticeship Committee
c/o Industry Programs and Standards
Apprenticeship and Industry Training
Advanced Education and Technology
10th floor, Commerce Place
10155 102 Street NW
Edmonton AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used. Recommendations for change will be placed on the agenda for regular meetings of the Recreational Vehicle Service Technician Provincial Apprenticeship Committee.

Apprenticeship Route toward Certification



Recreational Vehicle Service Technician Training Profile
First Period
(8 Weeks 30 Hours per Week – Total of 240 Hours)



Second Period
(8 Weeks 30 Hours per Week – Total of 240 Hours)

SECTION ONE

EXTERIOR STRUCTURE AND COMPONENTS
90 HOURS

A	B	C
Body Construction and Fixtures 54 Hours	Estimating 10 Hours	Exterior Accessories 11 Hours

D
Body Panel Repair 15 Hours

SECTION TWO

RV APPLICATIONS
40 HOURS

A	B	C
Truck Campers 7 Hours	Motor Homes 7 Hours	Expandable/Fold-Down Units 10 Hours

D	E
Interior Accessories 12 Hours	Specialty Haulers 4 Hours

SECTION THREE

LP GAS APPLIANCES
45 HOURS

A	B	C
Furnaces and Heating Systems 30 Hours	Water Heaters 10 Hours	Stoves, Ranges and Portable BBQ's 5 Hours

SECTION FOUR

ELECTRICAL
55 HOURS

A	B	C
AC Current 15 Hours	Generators 15 Hours	Power Converters and Charging Systems 20 Hours

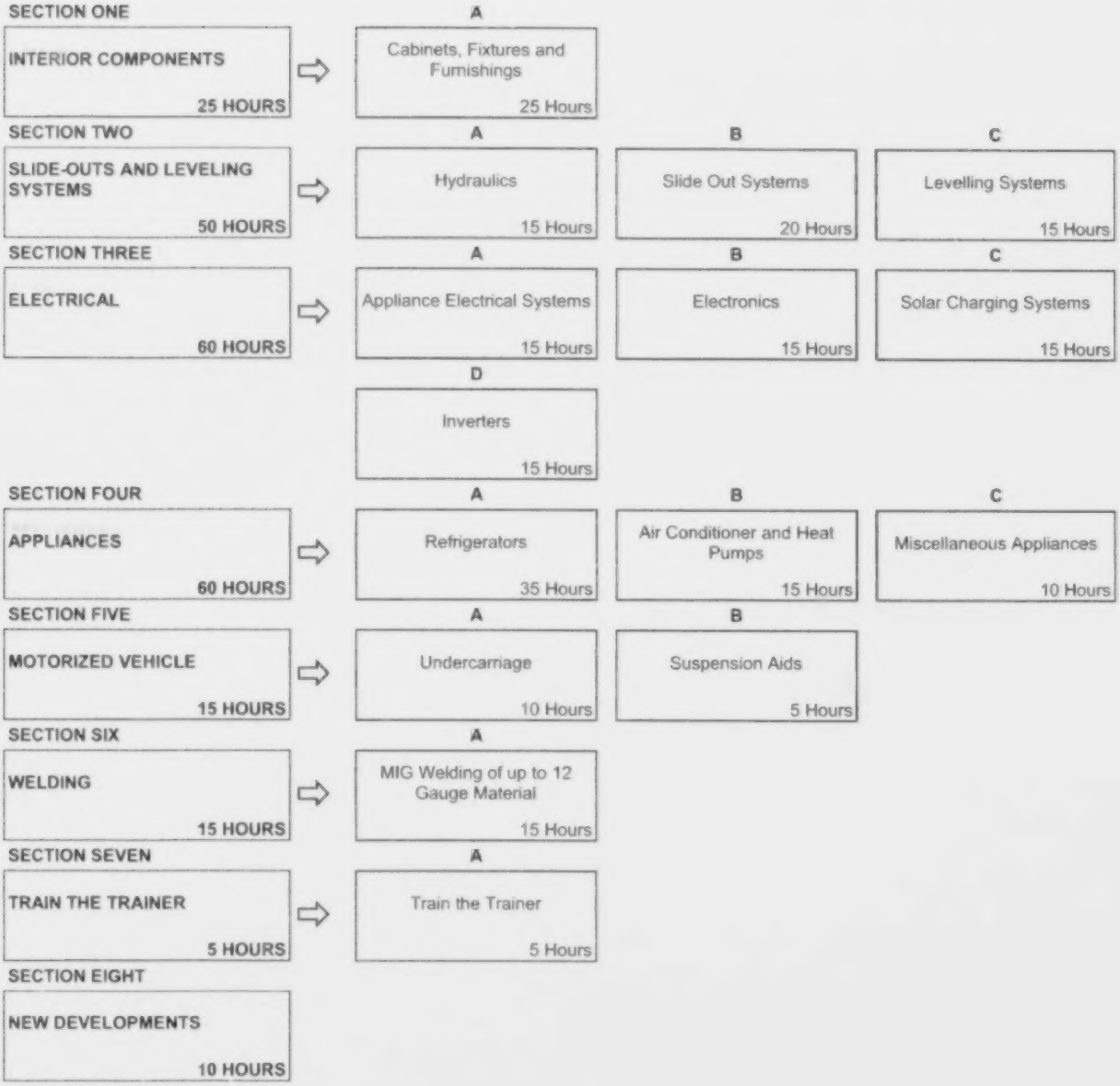
D
Appliance Circuitry 5 Hours

SECTION FIVE

ADMINISTRATION
10 HOURS

A	B	C
Parts Management 5 Hours	Work Orders 3 Hours	Customer Relations 2 Hours

Third Period
(8 Weeks 30 Hours per Week – Total of 240 Hours)



NOTE: The hours stated are for guidance and should be adhered to as closely as possible. However, adjustments must be made for rate of apprentice learning, statutory holidays, registration and examinations for the training establishment and Apprenticeship and Industry Training.

FIRST PERIOD TECHNICAL TRAINING
RECREATIONAL VEHICLE SERVICE TECHNICIAN TRADE
COURSE OUTLINE

Due to the nature of the work of the Recreation Vehicle Service Technician, it is imperative that safety be taught on a continuous basis throughout the entirety of this course.

The hours listed are suggested times and include lab and shop time for practical application of the theory.

Upon successful completion of this program the apprentice should be able to perform the following outcomes and objectives.

SECTION ONE: ..... SAFETY, TOOLS AND SHOP EQUIPMENT ..... 30 HOURS

A. Apprenticeship Orientation ..... 2 Hours

Outcome: ***Understand the role of the tradespersons, employers, Local Apprenticeship Committees, the Provincial Apprenticeship Committee and Alberta Apprenticeship and Industry Training in the development and maintenance of the Recreation Vehicle Service Technician trade in Alberta.***

1. Describe the apprenticeship training system in Alberta.
2. Study the training profile of the recreation vehicle service technician apprenticeship in Alberta.
3. Describe the recreation vehicle service technician program outline learning outcomes and objectives.
4. Describe the responsibilities for the Contract of Apprenticeship by the apprentice, employer and Alberta Apprenticeship and Industry Training.
5. Describe a variety of employment opportunities for recreation vehicle service technicians.
6. Become familiar with the contents of the apprenticeship training record book.

B. Workshop Safety ..... 10 Hours

Outcome: ***Identify and understand health and safety issues.***

1. Understand Occupational Health and Safety Regulations.
2. Ability to handle and store flammable and toxic materials.
3. Identify proper ventilation and exhaust system regulations.
4. Use proper personal protection (i.e. gloves and boots).
5. Understand fall protection devices.
6. Identify and demonstrate the use of various fire extinguishers.

C. Mathematics ..... 8 Hours

Outcome: ***Solve trade-related problems using basic mathematical skills.***

1. Calculate linear dimensions, area, and volume using both the S.I. Metric and Imperial units.
2. Add, subtract, multiply and divide using the appropriate units.
3. Convert linear dimensions, area, and volume between the S.I. Metric and Imperial units.

D. Hand and Power Tools ..... 10 Hours

Outcome: ***Demonstrate the ability to use tools.***

1. Demonstrate the safe use and handling.
2. Perform minor repairs and adjustments.
3. Demonstrate maintenance procedures.

SECTION TWO: ..... TRAILER AND TOWING SYSTEMS ..... 42 HOURS

A. Undercarriage ..... 18 Hours

Outcome: ***Describe and perform undercarriage maintenance and repair procedures.***

1. Describe the construction of the trailer and fifth wheel trailer frames.
2. Identify various trailer axle types and weight ratings.
3. Describe alignment procedures.
4. Distinguish between different suspension systems, their ratings and applications.
5. Describe different wheel types and their coding.
6. Service and repair wheel bearings and seals.
7. Identify the components of electric and hydraulic braking systems.
8. Service, repair and maintain electric braking systems.
9. Service, repair and maintain electric hydraulic braking systems.
10. Describe tire construction, sizing and load ratings.
11. Identify various tire wear patterns and their cause.
12. Describe problems created by unbalanced wheels.
13. Describe breakaway switch installation and application.
14. Understand applicable codes and regulations.
15. Describe and service different types of fifth wheel landing gear and trailer tongue jacks.

B. Hitch Systems ..... 12 Hours

Outcome: ***Identify and install various types of hitches.***

1. Describe weight distributing hitches and their installation and application.
2. Describe sway control devices and their application.
3. Describe the importance and proper use of safety chains.
4. Describe fifth wheel, goose neck hitches and their installation and application.
5. Describe how to adjust 5th wheel goose necks and hitches to ensure proper height alignment.
6. Describe methods, regulations and applications used for towing automobiles:
   a) tow bar
   b) car dolly
   c) other related items

C. Tow Vehicle ..... 12 Hours

Outcome: ***Prepare vehicle for towing applications.***

1. Wire a tow vehicle to applicable codes.
2. Describe braking system installation and applications.
3. Describe the application and installation of charging system isolators and relays.
4. Identify and install brake controllers and their components.
5. Describe the installation of an electronic brake controller.
6. Troubleshoot an electronic brake controller.
7. Awareness of SIR (Supplemental Inflated Restraint) systems.

SECTION THREE: ..... ELECTRICAL SYSTEMS - 12 VOLT ..... 45 HOURS

A. Basic Electricity ..... 35 Hours

Outcome: ***Understand the principles of direct current.***

1. Define basic electricity.
2. Classify basic electrical circuits.
3. Describe the function of components in an electrical circuit.
4. Diagnose and repair 12 volt electric circuits and components.
5. Perform the installation of 12 volt components.
6. Apply the current code (CSA Z-240) as it relates to the 12 volt electrical system.
7. Identify different wire types, gauge sizes and their application.
8. Calculate wire gauge sizes relative to various loads.
9. Calculate circuit protection requirements.

B. Battery ..... 10 Hours

Outcome: ***Understand batteries and their application.***

1. Identify the various types of batteries and their application.
2. Describe the maintenance, storage and installation of a battery.
3. Describe the procedures for recharging a battery.
4. Describe the procedures for boosting a battery.
5. Describe the procedures for testing a battery.
6. Identify different types of battery disconnect devices.

SECTION FOUR: ..... FUEL SYSTEMS ..... 60 HOURS

A. Propane Systems ..... 50 Hours

Outcome: ***Understand the principles and characteristics of propane systems.***

1. Describe the nature and properties of propane.
2. Describe the procedures of handling propane.
3. List the proper storage vessels for propane.

4. List the steps required for inspection and re-certification of propane storage vessels
5. Identify approved propane supply components.
6. Identify approved barbecue connections.
7. Describe the procedure used to adjust a propane regulator.
8. Describe the purpose of a relief valve.
9. Identify various propane leak detectors and their installation.
10. Identify applicable codes that apply to propane systems.
11. Perform a L.P.G. leak test using different instruments.
12. Install/service/repair a propane system.
13. Determine vessel requirements to meet system demands at various temperatures.
14. Identify contamination causes, symptoms and repair procedures.

B. Auxiliary Gasoline Fueling Systems ..... 10 Hours

Outcome: ***Install, service and repair auxiliary gasoline systems.***

1. Describe the nature and properties of gasoline.
2. Describe the procedures of handling gasoline.
3. List the proper storage vessels for gasoline.
4. Explain the procedure for dispensing gasoline.
5. Identify approved gasoline storage, distribution and supply components.
6. Identify applicable codes that apply to gasoline systems.

SECTION FIVE: ..... APPLIANCES ..... 10 HOURS

A. Appliances ..... 10 Hours

Outcome: ***Understand the removal, installation and operation of appliances.***

1. Describe the removal and installation procedures of the following appliances and accessories:
   a) counter top stoves
   b) ranges
   c) range hoods
   d) refrigerators
   e) furnaces
   f) fans
   g) air conditioners
   h) microwave ovens
   i) water heaters
2. Explain the operation of the above RV appliances and accessories to the customer.

SECTION SIX: ..... PRE-DELIVERY INSPECTION ..... 12 HOURS

A. Checks Prior to Delivery. .....8 Hours

Outcome: ***Perform pre-delivery inspections.***

1. Leak test propane systems and adjust regulators.
2. Test all appliances.
3. Test electrical systems.
4. Test all safety related items.
5. Test plumbing systems.
6. Check accessories and other systems.
7. Utilize pre-delivery inspection sheets.
8. Check all fluids in power train (coolant, oil, etc.).
9. Perform overall interior and exterior inspection.

B. Clean For Delivery .....4 Hours

Outcome: ***Perform cleaning procedures.***

1. Identify the appropriate cleaners used to clean the interior and exterior of a unit.
2. Identify the hazards associated with some cleaners and polishes.

SECTION SEVEN: ..... CUTTING AND HEATING ..... 10 HOURS

The instruction under this section shall not be to the level of proficiency of a skilled Welder. The intent is to train the apprentice to a level where he may operate the required equipment in a safe manner, and perform cutting and heating operations.

A. Cutting and Heating with Oxyacetylene .....10 Hours

Outcome: ***Describe and demonstrate cutting and heating techniques.***

1. Explain the characteristics and handling procedures of oxygen and acetylene.
2. Identify the various cylinders and fittings by thread design and sizes.
3. Explain the design of cylinders and procedures for handling, storage and transport.
4. Recognise the construction and function of regulators and hoses.
5. Explain handling precautions for regulators and hoses.
6. Detect and repair gas leaks.
7. Explain the construction and function of torch tips.
8. Demonstrate how to clean, store and maintain torch tips.
9. Explain torch malfunctions and how to correct them.
10. Select the attachments required for cutting and know the required safety precautions.
11. Perform basic cutting operations.
12. Use the required protective equipment.

SECTION EIGHT: ..... PLUMBING ..... 31 HOURS

A. Fresh Water Systems ..... 16 Hours

Outcome: ***Understand potable water systems, repair, and installation procedures.***

1. Identify and repair pumps and supply systems (includes multiple switching).
2. Identify water storage systems and the maintenance/repair requirements.
3. Identify components and their repair and replacement procedures.
4. Describe installation and repair procedures of:
   a) showers and shower stalls
   b) sinks
   c) taps
   d) bath tubs and tub surrounds
   e) toilets (fixed and portable)
   f) other fixtures
5. Test, troubleshoot and repair/replace monitor panels and sensors.

B. Waste Water Systems ..... 12 Hours

Outcome: ***Understand wastewater systems, repair, and installation procedures.***

1. Identify types of storage and drain systems.
2. Describe the construction, repair, and installation procedures.
3. Identify code requirements.

C. Winterizing ..... 3 Hours

Outcome: ***Perform winterizing and de-winterizing of water systems.***

1. Describe the type of antifreeze (non toxic) used to prevent damage from freezing.
2. Describe how to winterize plumbing systems.
3. Describe how to de-winterize plumbing systems.
4. Describe methods of sanitizing water systems.

SECOND PERIOD TECHNICAL TRAINING
RECREATIONAL VEHICLE SERVICE TECHNICIAN TRADE
COURSE OUTLINE

Due to the nature of the work of the Recreation Vehicle Service Technician, it is imperative that safety be taught on a continuous basis throughout the entirety of this course.

The hours listed are suggested times and include lab and shop time for practical application of the theory.

Upon successful completion of this program the apprentice should be able to perform the following outcomes and objectives.

SECTION ONE:..... EXTERIOR, STRUCTURE AND COMPONENTS ..... 90 HOURS

A. Body Construction and Fixtures..... 54 Hours

Outcome: ***Maintain and repair the exterior and related components.***

1. Describe wood frame construction.
2. Describe laminated construction.
3. Describe aluminum construction.
4. Identify various types and profiles of siding.
5. Replace metal siding.
6. Describe aircraft type construction.
7. Replace fibreglass or filon panels.
8. State types of glass used in windows and the applicable codes.
9. Describe the repair and replacement of doors, windows, vents, and related hardware.
10. Describe the installation of roof vents and fixtures.
11. Repair dust and water leaks.
12. Describe different types of insulation and their application.
13. Replace interior wall and ceiling coverings and panels.
14. Describe different types of roof construction.
15. Describe roof repair, maintenance and replacement procedures.
16. Describe products and methods to aid cold weather use:
    a) storm windows
    b) insulation
    c) heat tapes
    d) plumbing system
17. Describe construction types of slide-out rooms.

B. Estimating ..... 10 Hours

Outcome: ***Write an estimate.***

1. Define an estimate.
2. Describe estimating procedures.
3. Understand competitive estimating.
4. Write an itemized estimate.

C. Exterior Accessories ..... 11 Hours

Outcome: ***Install and repair exterior accessories.***

1. Describe the installation and repair of awnings:
   a) roller drives
   b) fabric replacement
   c) adjustment and alignment
2. Describe installation of screen rooms.
3. Describe the installation of wind deflectors.
4. Describe the proper installation of cargo racks and ladders.
5. Describe the installation and replacement of back-up alarms and back-up monitoring devices.
6. Describe installation, diagnostics and repairs of electric steps.

D. Body Panel Repair ..... 15 Hours

Outcome: ***Repair/replace body panels.***

1. Describe the repair of fibreglass/filon panels and components.
2. Describe the repair of glass reinforced plastic panels and components.
3. Describe the repair of plastic components.
4. Recognize the hazards associated with paints and chemicals.
5. Replace or install decals and graphics.

SECTION TWO: ..... RV APPLICATIONS ..... 40 HOURS

A. Truck Campers ..... 7 Hours

Outcome: ***Install and repair camper tie downs and jacks.***

1. Describe the types of tie downs.
2. Describe the load capacity of camper tie downs.
3. State types of truck camper jacks and their capacity.
4. Repair truck camper jacks.
5. Install truck camper jacks.

B. Motor Homes ..... 7 Hours

Outcome: ***Understand motor home chassis controls.***

1. Describe motor home operator controls.
2. Describe operation of remote starters and anti-theft devices.
3. Describe motor home safety equipment and features.
4. Understand codes and regulations as they apply to motor homes.
5. Describe diesel engine start up procedures and air systems.

C. Expandable/Fold-Down Units ..... 10 Hours

Outcome: ***Maintain, service and repair lift and wall systems.***

1. Describe types of lift systems.
2. Describe operation of lift systems.
3. Describe the repair and adjustment of lift systems.
4. Repair and maintain canvas and hard wall systems.

D. Interior Accessories ..... 12 Hours

Outcome: ***Install accessories and safety components.***

1. Describe the installation of antennas, receptacles, cable hook-ups and distribution systems.
2. Describe the installation of security systems.
3. Describe the installation of an entertainment system.
4. Describe the installation and testing procedures of carbon monoxide, propane, and smoke detectors.

E. Specialty Haulers ..... 4 Hours

Outcome: ***Identify types of haulers and components.***

1. Describe ramps, gates, hinges, spring assemblies and cargo tie-downs.
2. Describe construction materials, flooring, and ventilation requirements.
3. Understand applicable codes and safety standards.

SECTION THREE: ..... LP GAS APPLIANCES ..... 45 HOURS

A. Furnaces and Heating Systems ..... 30 Hours

Outcome: ***Install, service and repair various heating systems.***

1. Describe the various types and their operation (includes hot water boiler systems).
2. Describe the components and their operation.
3. Identify the related types of thermostats and climate controls.
4. Test and repair furnaces and related items.
5. Describe ventilation, installation and air flow requirements.
6. Describe maintenance procedures.

B. Water Heaters ..... **10 Hours**

Outcome: ***Install, service and repair various water heating systems.***

1. Describe the various types and their operation.
2. Describe components and their operation.
3. Identify the related types of thermostats.
4. Test and repair water heaters and related items.
5. Describe ventilation and installation requirements.
6. Describe maintenance procedures.

C. Stoves, Ranges and Portable BBQ's ..... **5 Hours**

Outcome: ***Service and repair cooking equipment.***

1. Describe the various types and their operation.
2. Describe components and their operation.
3. Test and repair stoves, ranges, portable BBQ's and related items.
4. Describe ventilation and installation requirements.
5. Describe maintenance procedures.

SECTION FOUR: ..... ELECTRICAL ..... 55 HOURS

A. AC Current ..... **15 Hours**

Outcome: ***Identify and diagnose AC electrical systems.***

1. State safety precautions when repairing AC electrical systems.
2. State the difference between AC and DC current.
3. Describe procedures used to install or repair electrical systems according to applicable codes.
4. Test a 120 V AC electrical system.
5. Identify and test various types of AC circuit protection devices.
6. Describe high pot tests.
7. Perform hot skin and polarity tests.
8. Describe various transfer switches used in Energy Management Systems:
   a) manual
   b) electronic
   c) automatic

B. Generators ..... **15 Hours**

Outcome: ***Install and service generators.***

1. Identify safety hazards.
2. Calculate output requirements.
3. Troubleshoot faults.
4. Describe installation procedures relative to applicable codes and regulations.
5. Wire 12 volt and 120 volt connections to applicable codes and regulations.

6. Describe and perform maintenance and adjustment procedures.
7. Test and adjust electrical outputs.

C. Power Converters and Charging Systems ..... 20 Hours

Outcome: ***Identify and repair power converters.***

1. State the function.
2. Describe the operation.
3. Describe the various types.
4. Describe ventilation and installation requirements.
5. Diagnose and repair.

D. Appliance Circuitry ..... 5 Hours

Outcome: ***Interpret and use diagrams.***

1. Use manufacturer's diagrams to trace the circuitry of appliances.
2. Draw ladder diagrams of appliance electrical circuits.
3. Use diagrams to diagnose electrical problems.

SECTION FIVE: ..... ADMINISTRATION ..... 10 HOURS

A. Parts Management ..... 5 Hours

Outcome: ***Identify various parts catalogue systems.***

1. Use cross reference catalogues.
2. Identify various types of computer parts catalogues.
3. Explain the use of the "internet" for parts ordering and information.

B. Work Orders ..... 3 Hours

Outcome: ***Prepare a work order.***

1. State work order requirements.
2. Describe types of work orders.
3. Describe procedures for documenting time.
4. Describe procedures for documenting parts.

C. Customer Relations ..... 2 Hours

Outcome: ***Communicate with customers.***

1. Define proper customer courtesy and personal conduct.
2. Understand customer needs and expectations.

THIRD PERIOD TECHNICAL TRAINING
RECREATIONAL VEHICLE SERVICE TECHNICIAN TRADE
COURSE OUTLINE

Due to the nature of the work of the Recreation Vehicle Service Technician, it is imperative that safety be taught on a continuous basis throughout the entirety of this course.

The hours listed are suggested times and include lab and shop time for practical application of the theory.

Upon successful completion of this program the apprentice should be able to perform the following outcomes and objectives.

SECTION ONE: ..... INTERIOR COMPONENTS ..... 25 HOURS

A. Cabinets, Fixtures and Furnishings ..... 25 Hours

Outcome: ***Repair cabinets, furnishings and flooring.***

1. Describe counter top construction and repair.
2. Describe repair procedures for cabinets.
3. Describe repair procedures for cabinet doors and hardware.
4. Describe repair procedures for drawers and hardware.
5. Describe methods of repairing upholstery.
6. Describe repair or replacement procedures for window coverings, blinds and valances.
7. Describe repair or replacement procedures for floor coverings:
    a) lino
    b) carpet
    c) hardwood
    d) ceramic tile
    e) laminate

SECTION TWO: ..... SLIDE-OUT AND LEVELING SYSTEMS ..... 50 HOURS

A. Hydraulics ..... 15 Hours

Outcome: ***Service and repair hydraulic systems.***

1. Define hydraulics.
2. State hydraulic system applications.
3. Identify the components of a hydraulic system.
4. Repair or replace hydraulic pumps, hoses, and components.
5. Test a hydraulic system.
6. Describe adjustment/balance procedures.

B. Slide Out Systems ..... 20 Hours

Outcome: ***Service, repair and maintain slide out systems.***

1. Identify the various mechanisms used to operate slide outs (gear, cable, hydraulic, manual).
2. Repair slide out mechanisms.
3. Adjust and align slide outs.
4. Describe maintenance procedures.
5. Describe procedures for room removal.

C. Leveling Systems ..... 15 Hours

Outcome: ***Install, service, repair and maintain leveling systems.***

1. Describe the types of levelling systems.
2. Identify the components of a levelling system.
3. Describe the installation of levelling systems.
4. Adjust levelling systems.
5. Diagnose and repair levelling systems.
6. Describe maintenance procedures.

SECTION THREE: ..... ELECTRICAL ..... 60 HOURS

A. Appliance Electrical Systems ..... 15 Hours

Outcome: ***Interpret and use formulas and diagrams.***

1. Use manufacturer's diagrams to trace and repair electrical problems.
2. Draw ladder diagrams of given appliance electrical circuits.
3. Calculate load ratings using ohms law.

B. Electronics ..... 15 Hours

Outcome: ***Identify, diagnose and repair electronic components.***

1. Identify electronic components and their application.
2. List the precautions required when handling and using electronic components.
3. Make repairs to the wiring of circuits up to an electronic component.
4. Diagnose electronic component failure.
5. Test electronic circuit boards.
6. Replace circuit boards.

C. Solar Charging Systems ..... 15 Hours

Outcome: ***Identify, install and diagnose solar systems.***

1. Identify the components of solar charging systems.
2. Describe the operation and application of solar charging systems.
3. Describe installation procedures.
4. State the purpose of voltage regulators.

5. State the purpose of diodes.
6. Size a solar charging/battery system to meet customer requirements.
7. Explain how a system can be expanded.
8. Troubleshoot/repair a solar charging system.

D. Inverters ..... 15 Hours

Outcome: Identify, install and diagnose inverters.

1. State the function of an inverter.
2. Identify the various types of inverters.
3. Describe the installation of an inverter.
4. Identify and calculate power draws, cable sizes and load protection devices.
5. Troubleshoot inverter systems.
6. Size an inverter/battery system.
7. Identify various types of inverter remote control panels.

SECTION FOUR: ..... APPLIANCES ..... 60 HOURS

A. Refrigerators ..... 35 Hours

Outcome: Service, install and repair refrigerators.

1. Identify the various types.
2. Describe the operation of an absorption refrigerator.
3. Describe the operation of a compressor refrigerator.
4. Identify components and their operation.
5. Diagnose and repair absorption refrigerators.
6. Diagnose and repair compressor refrigerators.
7. Describe maintenance procedures.
8. Describe ventilation and installation requirements.

B. Air Conditioners and Heat Pumps ..... 15 Hours

Outcome: Maintain, install and diagnose air conditioners and heat pumps.

1. Describe the various types and their operation.
2. Describe components and their operation.
3. Describe heat strips.
4. Identify the various types of thermostats and climate controls.
5. Diagnose air conditioners/heat pumps and related systems.
6. State ventilation, installation and air flow requirements.
7. Describe maintenance procedures.
8. Awareness of the disposal, reclaiming and recycling of refrigerants.

C. Miscellaneous Appliances ..... 10 Hours

Outcome: ***Identify maintenance and installation requirements.***

1. Describe types, maintenance and installation requirements of the following:
   a) washers and dryers
   b) dishwashers
   c) microwave ovens
   d) icemakers
   e) range hoods
   f) central vacuum cleaners
   g) fireplaces
   h) other appliances

SECTION FIVE: ..... MOTORIZED VEHICLE ..... 15 HOURS

A. Undercarriage ..... 10 Hours

Outcome: ***Understand undercarriage and suspension system applications.***

1. Identify various load ratings (GVW, etc.).
2. Describe the construction of vehicle frames (car, truck, van, motorhome).
3. Distinguish between different suspension systems.
4. Describe the effect of add-on suspension aids relative to:
   a) ABS braking systems
   b) load sensing proportioning valves
   c) automatic load leveling systems
   d) wheel alignment angles
   e) drive line working angles
   f) load ratings
5. Determine from manufacturers' specifications the difference between standard vehicle and vehicle with towing package.
6. Describe how different tire sizes affect the power train:
   a) RPM to road speed
   b) ABS and other computer controlled systems

B. Suspension Aids ..... 5 Hours

Outcome: ***Install, diagnose and repair suspension aids.***

1. Select and install suspension aids as per manufacturers specifications:
   a) overloads
   b) air bags
   c) lift kits
2. Describe adjustment procedures.
3. Diagnose and repair suspension aids.

SECTION SIX:..... WELDING ..... 15 HOURS

The instruction under this section shall not be to the level of proficiency of a skilled Welder. The intent is to train the apprentice to a level where he may operate the required equipment in a safe manner, and perform tack welds to make temporary attachment of component parts prior to the finish welding performed by a certified journeyman welder.

A. **MIG (GMAW) Welding of Up to 12 Gauge Material ..... 15 Hours**

Outcome: ***Perform basic welding procedures.***

1. Describe the operation of a MIG welder.
2. Describe and demonstrate the preparation of material.
3. List the purpose of shielding gas.
4. Describe and demonstrate the proper sequence of start up and shut down of a MIG welder.
5. Demonstrate the ability to perform tack welds.

SECTION SEVEN: ..... TRAIN THE TRAINER ..... 5 HOURS

1. Understand the requirements of training apprentices.

SECTION EIGHT: .....NEW DEVELOPMENTS..... 10 HOURS

This section is to cover any new technological developments in the Recreation Vehicle Service Technician trade until it can be included in the next curriculum revision.

Excellence through training and experience

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